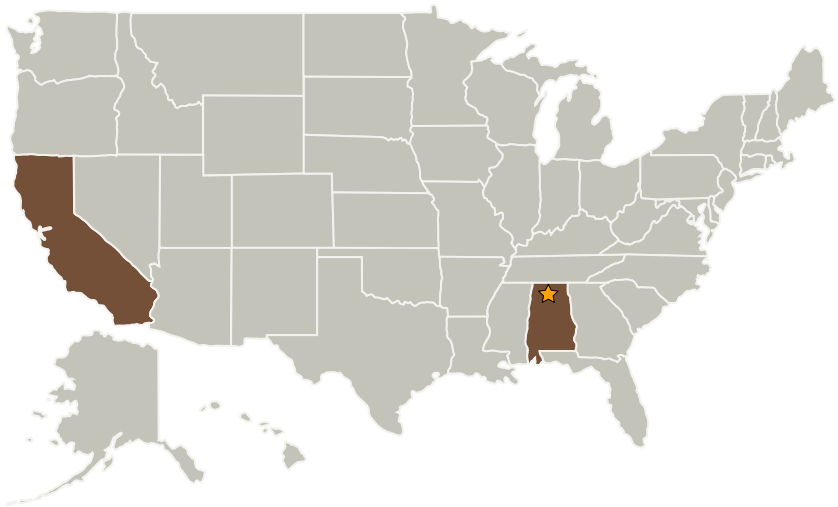
Extremely Lightweight Segmented Membrane Optical Shell Fabrication Technology for Future IR to Optical Telescope, Phase I

Completed Technology Project (2007 - 2007)

Project Introduction

We propose that the Membrane Optical Shell Technology (MOST) substrate fabrication approach be extended with a specific focus on advanced off-axis very light weight, cost advantaged, optical surfaces for future telescope applications. The approach is based on a proven combination of 1) continuous thin film materials with space heritage, 2) inherent low areal density (40 to 200g/m2) surfaces, 3) cost and time advantaged fabrication techniques that 4) impart structural shell stiffness through the induction of permanent curvature, yielding 5) interferometrically confirmed optically sufficient low surface roughness and thickness variation and rapidly improving global figure metrics, 6) volume efficient stacking or compact roll stowage and robust passive self deployment, and when needed, 7) compatibility with boundary control/adjustment to provide initial phasing and reject environmental disturbances. In the PI, building on our base of past research, we will demonstrate ability to directly fabricate the desired off axis segmented surfaces, continue to improve global figure metrics, address potential structural load survival and dynamic concerns, and begin to address other key issues critical toward improving TRL levels. This will prepare the way for a detailed PII ground demonstration and adoption into a flight program which is a key step in any realistic commercialization plan for space hardware.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Mevicon, Inc.	Supporting Organization	Industry	Sunnyvale, California

Primary U.S. Work Locations	
Alabama	California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.3 Electronics and Optics Manufacturing Process